Code # 162
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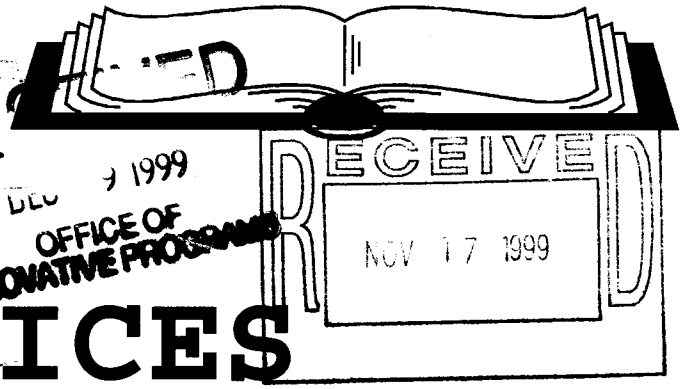
NEW JERSEY

1999-2000 Guidelines and Application

BEST PRACTICES



ORIGINAL

DEC 1999

OFFICE OF INNOVATIVE PROGRAMS

Deadline for Application to County Office: NOVEMBER 22,1999

Category Science (Application is limited to one category. See page 3 for details.)
Practice Name "Physics is Phabulous"
Number of Schools with Practice 1 (If more than one school or district, read and complete information on page 2.)

County	Essex
District (Proper Name)	Fairfield School District
District Address	230 Fairfield Road
	street/p. o. box 230 Fairfield Road
	city Fairfield 07004 zip code
District Telephone	973-227-2638 Fax 973-227-8994 Email jglevitt@aol.com
Chief School Administrator	Barry Spagnoli
Nominated School #1 (Proper Name)	
School Address	Churchill School
	street/p. o. box 230 Fairfield Road
	city Fairfield 07004 zip code
School Telephone	973-227-2638 Fax 973-227-8994 Email jglevitt@aol.com
School Principal	Anthony Santucci
Program Developer(s)	Eileen Tahaney, Elaine Pagano, Michael Gilmore
Chief School Administrator's or Charter School Lead Person's Signature	Barry A. Spagnoli

FOR USE BY COUNTY SUPERINTENDENT OF SCHOOLS ONLY

Approved: ✓ Yes ___ No **County Superintendent's Signature** Anthony P. Marino (acting)

NEW JERSEY STATE DEPARTMENT OF EDUCATION

NEW JERSEY

BEST PRACTICES

1999-2000 APPLICATION

Application Requirements:

- **RESPONSES to the information and the statements below must be ANONYMOUS.** No reference should be made to the names of the district or the school(s). Use the words "the school" or "the schools" in referring to the applicant in responding to the statements.
- **USE ONLY THE SPACE PROVIDED ON THE APPLICATION FORM on pages 1, 2 (if applicable) and 4 and THE NUMBER OF LINES SPECIFIED FOR RESPONSES to the statements.** Do not include any additional materials, as they will not be reviewed in the selection process.
- Application must be **keyboarded on 8 ½" x 11" white paper, portrait** format. **Ten-point or larger computer font** or **twelve-pitch or larger typewriter font** must be used. (This sentence is in ten-point.)
- **KEYBOARDED RESPONSES** to the statements below must be **no more than a total of three pages. Keyboard the statement followed by the response.** Format your response to the number of lines specified.
- **The information on page 4 and the keyboarded responses** to statements must be printed or copied **on one side of the page. The information on pages 1 and 2 (if applicable)** must be printed or copied **on one side of the page.** Staple pages 1 and 2 (if applicable) and 4 and the keyboarded responses together.
- **The original application must be signed by the district chief school administrator or charter school lead person, indicating his/her approval.**
- **The original and seven copies of the application** must be submitted to the county superintendent of schools by **November 22, 1999,** with the **Itemized List of District Applications** form. Keep the seven copies of each application together with the original containing the signature of the district chief school administrator or charter school lead person on the top of each set.
- **FAILURE TO COMPLY WITH THE PROCEDURES FOR SUBMISSION OF THE APPLICATION MAY RESULT IN THE ELIMINATION OF THE APPLICATION.**

The following data is required to assist the panelists in the evaluation of the application:

Type of School	Grade Levels
X Elementary School	6
___ Middle School	___
___ Junior High School	___
X High School	12
___ Other: ___	___

Practice Name "Physics is Phabulous"

Number of Schools with Practice 1

Number of Districts with Practice 1

Check the ONE CATEGORY into which the practice best fits.

___ Arts (Visual and Performing Arts)	___ Educational Technology	___ Safe Learning Environment
___ Assessment/Evaluation	___ Health and Physical Education	___ School-to-Careers/Workplace Readiness
___ Bilingual Education and Diversity	___ Language Arts Literacy	X Science
___ Citizenship/Character Education	___ Mathematics	___ Social Studies
___ Early Childhood Education Programs	___ Professional Development	___ Special Education
___ Educational Support/Guidance and Counseling Programs (services contributing to high student achievement)	___ Public Engagement (family involvement and partnerships with business, community and/or higher education)	___ World Languages

1. Describe the practice proposed for recognition, and list its objectives. Detail how the practice is innovative, how it promotes high student achievement and how it can be replicated. **(Maximum of 50 lines for response)**

2. Describe the educational needs of students that the practice addresses and how they were identified. List the *Core Curriculum including the Cross-Content Workplace Readiness Standards** addressed by the practice and describe how the practice addresses the standard(s). **(Maximum of 50 lines for response)**

3. Document the assessment measures used to determine the extent to which the objectives of the practice have been met. **(Maximum of 60 lines for response)**

*The 1996 edition of the ***Core Curriculum Content Standards*** published by the New Jersey State Department of Education was disseminated to all districts and charter schools and is available on line through the department's website at http://www.state.nj.us/education.

1. Describe the practice proposed for recognition, and list its objectives. Detail how the practice is innovative, how it promotes high student achievement, and how it can be replicated.

Two sixth grade classes, comprised of high enrichment and learning disabled mainstreamed students, were involved in the investigation of the nature and properties of waves and how waves transmit light and sound energy. In the elementary classroom, the teachers identified the main concepts and the students developed questions to be pursued. The teachers directed the lessons allowing the students to observe, predict, and record how light travels in waves, how wavelengths and frequencies are measured, and how light can be reflected and refracted. The students also observed how sounds are produced and drew conclusions about how sound waves move through matter.

To extend the lesson, the elementary teachers collaborated with the high school physics teacher. The teachers co-planned and devised an interactive lesson. The concepts and subconcepts taught on the elementary level were discussed and the physics teacher decided to use his advanced placement physics students as lab instructors to help organize a "Physics is Phabulous Lab." The elementary students were invited to spend one morning in the high school physics lab. Here the advanced placement high school students, under the direction of their teacher, engaged the elementary children in a lecture-demonstration on the topics of light and sound. The physics teacher reviewed some of the major concepts that were taught in the elementary classroom and the AP students worked with small groups of elementary students and monitored completed performed activities. These activities included: using a slinky type of coil to demonstrate the characteristics of waves, using tuning forks to observe the frequency of sounds, and using mirrors to explore how light from an object can be projected onto a screen with the help of a lens or curved mirror. For each activity, the elementary students were asked to follow a set of written instructions and record observations, make drawings of their findings, and confer with their lab instructor to check for accuracy. The lab instructor was then asked to elaborate on the students' findings. During the session, the physics teacher also demonstrated some optical illusions using light. An oscilloscope was used to indicate pictures of sound waves.

This activity was innovative because it was never done before. The elementary students had the opportunity to work in a high school physics lab. Here they were made aware of the safety precautions that go along with working in a lab situation. The students were exposed to the modeling of AP students. These AP students had to be able to relate to these younger students and be able to modify instruction to meet the instructional level. The concepts discussed in the elementary setting were reinforced in the lab environment to enhance academic achievement.

This activity could easily be replicated with any sixth grade elementary class and high school students with the guidance and the cooperation of the respective classroom instructors.

2. Describe the educational needs of students that the practice addresses and how they were identified. List the *Core Curriculum including the Cross-Content Workplace Readiness Standards* addressed by the practice and describe how the practice addresses the standard(s).

Relating this activity to the core curriculum, many of the standards were addressed. Specifically, standards 5.1, 5.2, 5.3, 5.4, 5.5, 5.8, 5,9, and 5.12 guided the students to the comprehension and application of the concepts of light and sound. Science process skills, critical thinking skills, and scientific reasoning skills were emphasized throughout the unit.

The *Cross-Content Workplace Readiness Standards* were also reenforced. In the elementary classroom, the students worked together to collect information and analyze the content. In small groups, they used their resources to find information and seek explanations. In the high school lab, the three ability levels worked cooperatively to complete the tasks. In each incident, good work habits were exhibited to comply with Standard 1.

Throughout the instuction, technology, information, and other tools were used to enhance the learning as indicated in Standard 2. In the elementary setting, the students conducted experiments using scientific tools. Videos were shown to complement classroom discussions. Computers were used to access additional information for reporting and researching. CD-ROMS were used for interactive activities. In the high school lab, mirrors were used for light activities; an oscilloscope was used to demonstrate sound waves; tuning forks and musical instruments were used to highlight sound activities.

In every lesson, the curriculum was extended to include activities to promote individual response and creativity. Strategies included using Bloom's Taxonomy, creative problem solving, and brainstorming. The students examined the information and were able to make predictions in their lab reports. They analyzed concepts by making charts to compare and contrast. They applied the information learned in the elementary classroom to the specific tasks in the high school lab. They formulated their own theories in their journal entries and evaluated them at the end of the lesson. All these activities relate to Standard 3 of the *Cross-Content Workplace Readiness Standards.*

The students always worked cooperatively, demonstrating "positive work behaviors" from Standard 4. The students were placed in a situation where they were exposed to the role modeling of high school advanced placement students and to the role of a high school physics teacher. In this lab situation, respect for different ages and abilities was demonstrated. The students witnessed how "ability, effort, and achievement are interrelated."

Finally, the students were exposed to the application of safety measures related to handling equipment and working in the high school lab as indicated in Standard 5. The high school physics teacher reviewed the rules for safety procedures in the lab setting. The students demonstrated these major procedures as they worked throughout the session.

In conclusion, many of the indicators within the *Cross-Content Workplace Readiness Standards* were integrated and properly executed throughout the content area.

3. Document the assessment measures used to determine the extent to which the objectives of the practice have been met.

In the elementary classrooms, a baseline assessment was used to establish the students' prior knowledge at the beginning of every chapter. Teacher directed activities and questions were initiated for students to record and save for follow-up. At the end of every unit, written tests were administered to assess the students' understanding and application of the key concepts of light and sound.

Throughout the unit, the students were evaluated on many different activities. They were asked to use journal entries to draw conclusions about the facts. Students also wrote lab reports which were checked by the teachers to see if the concepts were carefully observed, if data was collected and recorded, and if predictions were reasonable.

To reenforce each concept, the students were evaluated on how they were able to use the ideas in new situations. They drew pictures of light waves. They composed charts to compare and contrast characteristics of plane, concave, and convex mirrors. They made graphs to expand their knowledge of a decibel chart and used flow charts with arrows to show the path that sound takes from its source to interpretation by the brain. Groups of students made a string phone to demonstrate how sound travels through matter. The high enrichment students used this simple instrument and investigated how it relates to the workings of a modern intercom system. These types of performance assessment activities were used to assess the students' comprehension and to foster critical thinking.

The students were able to use the concepts taught in the elementary classroom and apply them to the situation in the high school lab. During this culminating unit performance task, the students collected data from the planned hands-on activities and the high school mentors were able to evaluate and expand the groups' findings. For the first activity, "Catching a Wave'" the students used a slinky type coil and demonstrated the characteristics of a wave. They were asked to follow a set of directions and draw pictures of their observations and then asked their high school mentor to check if their observations were correct. In the second activity, "Sounds Good To Me," the students used tuning forks to compare differences in sounds. To assess this concept, the mentors used a "buzzing ball" and students would observe the changes in frequencies of the sound while the ball moved away from the student and towards the student. In activity 3, the elementary students explored how light from an object can be projected onto a screen with the help of a lens or a curved mirror. Again, directions were given for students to follow with a final evaluation by the high school students. In the latter part of the session, the high school physics teacher demonstrated different optical illusions using a light source. He also used technology to demonstrate different sound frequencies.

A follow-up discussion in the elementary classroom ended with the students writing a thank you letter to the high school students highlighting some of the specific concepts learned.

In each of the carefully planned lessons, assessment for the unit's objectives were successfully measured.